Notebook, PN-89-04-12

This pocket notebook was used by Edison. The only dated entry is for April 12, 1889, and concerns incandescent and arc lamp designs. Preceding that entry are a series of numbered notes on phonograph cylinder experiments. The book was also used from the back forward for notes on chemical reagents and a list of elements and densities. The pages are unnumbered. Approximately 50 pages have been used.

flex plea gr…

Watts 3rd pt 2. Hydro-oxycamphronic acid 3rd line from bottom p 1072

Fils. Solid Ditolyl. 3rd sup pt 2 1064 – Decomp Hydebris –

Do – p. 1055 13 line from bottom phenyl-hydrazine-phenyl-Thiocarbazite.

Do 1044 – Diazoxy benzoic acid. p bly Carbonize with melting

Do Isobutylamaric acid phono – 1st line from bottom p 1127

Do p 1128 amaric acid – phono

Do 1147 – phono – Allyl acetone

Do 1156 8th line from top, phono

Do 1158 – fils – Kinoin – 9th line from top look at formula –

3rd suppt 2 - 1165 - Laurocerasin
11th line from bottom phono
do - 1173 Chlorolepidine
2nd line from bottom of paragraph
phono -
do 1175 - Dichloroxylepidinic acid
phono
do 1177. Tetrahydro-isolepidine 3rd
line from bottom paragraph
1180 - amidocaproic anhydride.
p 1257 phono - Isomalic acid -
1260 Insulation Bromomalonic acid
Look at formula -
p 1260 - Dihydroxymalonic acid
Calcium salt amorphous
1267 - Mannitan 2nd line from
bottom phono
1316 - Methyl-propyllactic acid
Barium salt amorphous

1344 - Myricyl alcohol
1344. Myricyl Hydrosulphide.
Melts 94 - yellow amorphous Mass

1346. Benzylnaphthalene
. 4th line from top paragraph
1358 - Naphthylphosphoric acid
glassy mass
1379 - Narceine. treated with
zinc etc. amorphous Salts.

Nitrate ammonia melts 152°
mixed phono material.

Dinitro-tolyl-phenyl Keotone
decomp without subliming -
Watts 3rd Sup 1420 4th pgh from
top - fits - also paragh below
trinitro -

Octoic acid. Sodium salt gummy
Barium do. Magnesium do
Lead amorphous - page 1424
3rd Sup

Potassium Isooctylsulphate Watts 3rd Sup 1425 Soapy to touch -

Isoctyl-phosphine. Spermaceti like mass just below above paragraph

Amidooeanthylic acid
3rd line from bottom p 1426 fils
also last 2 lines 4-5 lines in p
1427 - phono -

P 1430 last 4 lines - phono also fils + insulator -

1432 good process seperating Oleic acid from stearic. 3rd Sup

Dinitro orcinol 6 7 + 8th line from bottom 1438 3rd Sup
fils -

1444 3rd Sup Benzaldehyde -
phono + fils - insulation

1444 - acinchonyl C pp
See g - phenol yields Quinolic
Ether white amorphous substance
phono

1452 - Sod Silicate polishing material phono points -

1457 & 1458 - phenylene - (meta)
Oxamic acid see last 3 lines
of pgh - fils -

1460 - Oxybenzoyl-anilide -
Read whole pgh - phono.

1468 B-Oxybutyric acid -
Barium salt amorphous

1469 - See Oxycoumarin
Chibouques without melting fil

1473 5th line from bottom Cu Salt. photo

1477 - fils - Oxyuvitic acid
Softens only & carbonizes

1489 Paraffinic acid 5 & 6th lines bottom page.

1495 - Insoluble propylpseudonitrite.

1495 - Photo - Butylpseudonitrite.

1499 - Insoluble - Penta-Tetra & Hex from anthracene

1500 Isopropyl-acetylene NG

1504 - Perbromethane. Insoluble

1506 - Perchloromesal "

1515 Dichlorophenanthrene
Photo -

Octochlorophenanthrene 1515
Miscellaneous

1523 Triamidophenol - paragh.
3 lines at bottom, fils good

1531 - Hydroxyphthalic acid -
Lead salt amorph. 3rd paragh from bottom

1548 Ethiodide of phenyl-furfuraldehydine - photo -

1553 - phenylarsenic acid
normal salts heavy metals mostly amorphous - Top lines.

1560 - Disuccinylphenylenediamine
Bottom pgh - fils -

Try Succinic acid for fils -

1574 - phospham 3 last lines of pgh
phono

1576 - phosphenylic acid see phosphenylates - neutral K salt uncrystalizable Calc salt amorp phono —

1578 Sodium amidophosphenylate pgh
Lead salt amorp phono

1590 - Pentfluoride phos - see its Combin with ammonia form yellowish white solid phono - Insulation -

1605 - Compounds of phenol-p- with phenols pgh - amorph powder phono

1617 Thioterephthalic acid
ms phono

1621 +2 - phthalylacetic acid - salts dif cristilize !

1626 +7 Magnesium salt dries up to amorp mass. phono -

1660 - 6th line from top to end of paragraph - phono - Ethylbromopodocarpic acid -

1676 - Cyanopropionic acid. amorp solid K salt is transparent solid phono

1682. See 26th line from top Vitreous solid.

1695 = Pseudoconine - all its salts are amorphous - phono

1697 - pseudothiocyanogen -
phono - Ino - fils pbly -

Acetylapoaconitine - 1696
forms amorphous salts.

1703 see 31st line from top
phono -

1720 - Nitropyroracemic Carbamide
amorp - Lead salt bulky jelly
phono also pyroracemic acid -
amorp - see 6th & 9th line from
bottom

1722 Calcium Glutarate pgh
see Magnesium Salt.

1723 - Glutamic acid
amorp phono gh

1729 - see 18th line from bottom
phono may be flexible -

1730 - see table -

1740 - good - fils - Quinol-dicarboxylic
acid 3 bottom lines of paragraph

1741 - Chlorinated quinone -
decomp by K to brown humus
perhaps a fil can be changed
that way - fils

1741 Nitranilic acid
decomp without melt. fils.
Quinyl oxide - amorp 1742
phono - may form good salt with stearic a

1744 - see Table (Lead acetate)

1746 - see last part of Colophthalin
paragraph - specially Colophalumina
fils

1748 Tribromoresoquinone -
6th line in pgh - good - Insulation
See its Constitution - only 1. H atom -

1750 - 2nd line from top - phono
good

1752 - Diethyl-resorcyl-aldehyde
Lead salt amorph - phono

1756 - see 16th line from top phono

1762 Hydrocyanorosanin
fibs -

1764 - Corallin pgh -
Read from bottom upto 15th
line - phono

1778 - formation of a resin by
light - phalosantonic acid

1783 Sebic acid Ca salt amorp
Pb do -

1793 Silicic phenyltrichloride
See center of pgh - phono -

1794 - Silicic Tolyltrichloride
Ins - fibs - phono - Curious

1821 - Bondonneau pgh on Iodine
starch - fibs -

1831 - styracin - Tetrabromide -
a Resin - Ino -

1853 Sulphobutyric acid pgh:
Cop salt green Varnish. Pb amorp
other salts i.e. mag - Na NH$_4$ amorp
phono -
β - Sulphobutyric ac 2nd line from
bottom phono

1860 Sulphopropionic a
Zinc salt gummy -

1862 - plastic sulphur in wet way
pgh Hodgkinson -

1865 . 9 + 10 line from
bottom phono

1866 - Sulphur Titanium O -
4th line in pgh -

1906 - see Camphenic action
stearic acid - phono

1907 - Teracrylic acid
$C_7H_{?}O_2$ Little H - Gn - see
Terpenylic acid paragraph

1908 - Tetrabromalizarin -
fils + Gno

1910 - Tetracetyl - Coniferin -
phono

1910 - Tetrachloralizarin
fils - fils & insulation -
Carb before melts,

1917 - Tetraterebenthene
amorph - phono - Varnish, flex
phono - also fils - g.d -

1922 Theobromic, highest known
fatty acid -

1955 – Thiobenzaldehyde –
4th line in pgh – phono

1956 – ~~Th~~ amidothiobenzamide –
Resinous mass – phono –

1963 – Thiocummylamide –
7th line down pagh – phono

1974 Stannodipropyl pgh –
action of alkali on Diiodide gives
amorp body – Insulation

1974 Stannic-di-iodo-di
action ammonia & K – amorph
solid – phono

1975 Stannic-Diphenylhydroxychloride
amorp powder The Chlorobromide
in same pgh – suddenly solidifies
to hard stony mass

1978 – gummy mass 2nd line
from bottom page.

1979 – Nitrides pgh – see 10 & 11 line
in pgh – fine powder moulded in stick &
then heated in ammonia to get fine
grinding stone, its harder than topaz – (10)
scratch corundum – perhaps a new
industry built up in opposition to Arkansas
stones, or for polishing french plate glass

2010 – see table. Free acid & Cad salt

2022 . 15th line from top. phono

2031 Fr-ks – Orthomonoallylarsenic
acid – para compound decomp at 300
without melting –

2037 - Tolylphenylacetic acid
Ba salt resinous - phono

2030 Trinitrotolylphenyl Ketone
5th line of paragh phano

2046 - Trichloracetone - Liq ? ?
" Trichloracetyl-Carbamide
does it burn ? ? see formula -

2048 - Trichlorophthalic acid
does it burn ? ?

2048 Trichloropropane pph -
5 line from bottom pp -

2065 - See action tartaric acid on normal alkali tungstate: uncrystlble double salts -
Tritungstates - Ca salt semi-solid glutinous - Magnesium do.
Manganous salt waxy yellow translucent mass Cobalt viscid Cad semi trans gummy mass See 2066 6th line from top -

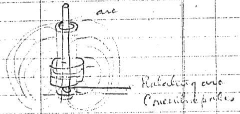
2084 - see last 3 lines of Carbcoration products Valeral P.

2085 See last 2 lines of Ethylic Hydroxyisobutylformate P.
End of part 2 - 3rd Sup -

Barker - Persulphate iron
Strong sol Evaporation to Varnish, brittle but suggest mixing glycerine with it

Carbon-Lime or magnesium Salts Squirted for fil. Carbonize & leave Lime in to increase Res -

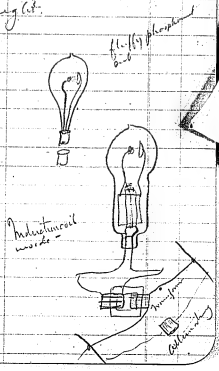
April 12 1889 -



Rotation by a magnet acting as motor

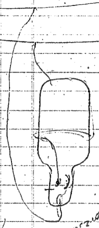
Kennelly Try -

Phosphorescent Electric Light.



multiple arc

Leyden jar
Idea



Phosphoresc...

April 12 89. Elec Light.

Organic compounds generally are much less soluble in Carbonic Bisulphide, Carbonic Tetrachloride & Chloroform than in Benzine.

Acetic acid dissolves Chromic Anhydride & Nitric acid also many others

Light Petroleum which consists of low boiling point Parafines is poor solvent & is used to crystallize bodies which are exceedingly soluble in Ether, Benzine & Carbonic Bisulphide.

Nitrobenzine, Aniline oil, & Turpentine Valuable Solvents

Fractional Crystalization — Fractional Solution (1) using small quantities of solvent which dissolves out most soluble substance 1st.

Fractional precipitation
Fractional Saturation
" Distillation
} Miller Organic 15 - 64 /

[THIS BOOK WAS USED IN BOTH DIRECTIONS. THE FOLLOWING PAGES WERE FILMED FROM THE BACK END FORWARD.]

Chlorinizing Agents & H reducers,
Chlorine passed into a hydrocarbon in a solution of pentachloride of Antimony
Pentchloride Molybdenium or Iodine
later two not so energetic. This is powerful.

Chlorine Hydrate.
Free Chlorine.
Saturated solution chlorine in Tetrachloride Carbon
Chloride Sulphur
Pentachloride Phosphorous.
Chloride Iodine
Chloride Bromine
Chloride Chromium
Peroxide Manganese Salt + Sulphuric acid
" " and Hydrochloric acid
Manganic Tetrachloride
Tungstic Hexachloride a solid.

See Meller Reaccea of Clic H-Cbn
organic chem

potassic Chlorate & Hydrochloric acid
but in many cases oxdation takes place also.
Free chlorine in very bright sunlight.

Oxydizing Agents.

Nitric Acid common

Fuming nitric acid

Peroxide of Lead

" - Silver ~~Mercury Oxide~~

" Barium

" Manganese

Chloric acid

Chlorous "

Perchloric acid

Permanganate Potash

Permanganate Potash + Sulphuric acid

Hypochlorous acid

Boiling Sulphuric acid

Peroxide of Hydrogen

Ozone

Aqua Regia 1 NO_3 4 HCl. Chlorinating

Argentic oxide

Ferric Chloride

Oxydizing Agents

Fused Sodic & Potassic Hydrates

Electrolysis.

Ferricyanide Potassium in alkaline Solution

Chromic acid

Chromic acid in Sulphuric acid

Chromic acid in Glacial acetic acid

Bichromate Potash & Sulphuric acid

Mercuric and Dry Argentic oxides

Chromate Plumbic, Cupric oxide.

Potassic Chlorate in solution converts Metallic proto oxides into peroxides on adding Hydrochloric acid, The Chloric acid set free being powerful oxidizer.

Nitrate Potash or Soda & an acid.

Sulphurizing agents
Dipotassic Pentasulphide
Sulphur flowers
Sulphur Vapor
Sulphur in Bisulphide Carbon
Sulphur in hot Toluene
Chloride Sulphur
Sulphur in Chloride Sulphur
" in Benzine hot
" Turpentine hot
Sulphuretted Hydrogen
Sulphurhydrate of Ammonia
Iodide of Sulphur
Phosphoric Sulphide removes O
+ substitutes Sulphur.
Hydric Persulphide $H_2 S_6$
Calcic pentsulphide CaS_5 -

Thioethers
preperation see Miller 705

Reducing Agents for O.

Hot Hydriodic acid. powerful
" " " sealed tubes
Hypophosphorous acid
Phosphorous
Phosphoretted Hydrogen gas
Copper Zinc Couples
Sodium Amalgam
Sodium
Sulphuric acid on Zinc
Hyposulphite Soda
Sulphite Soda
Cyanide Potassium, powerful
Stannous Chloride.
Hydrochloric acid on tin
" on Zinc
Sulphurous anhydride.
Zinc dust,
Iron and acetic acid

Reducing Agents

Ammonic Sulphite

Sugar

Albumen

Hydroxylamine, powerful

Alcoholic Potash is powerful reducing agents for some metallic oxides, it gradually absorbs O from the air

Nitroysl Reducers:

Stannous Chloride – powerful afinity for O + Cl

Sulphydrate ammonia

Hot Ferric Chloride, perhaps Ferrous,

Nascent Hydrogen,

Dehydrating Agents.
Phosphoric Anhydride
" Pentasulphide
Potassic hydric Sulphate
Zinc Chloride;
Hydrochloric acid when heated
Hydrofluoric acid
Sulphuric acid

Brominizing

Bromine.

Bromine in presence of Iodide of Bromine

Bromine in " Antimonic Pentabromide

Conducting Chemical Compounds

Plumbago
Charcoal
Ignited Anthracite
Peroxide Lead
" Manganese
" Silver
Iodide Copper
Sulphide Iron
" Lead
" Copper
" Molybdenum plumbago like, test
" Chromium " "

Nitroysl Additives.
Nitric with Sulphuric
Nitrous acid
Action of Argentic Nitrite on the
Iodo=derivatives of hydrocarbons; when
Nitric fails —

Nitroyl Hydrocarbons combine with
Metals to form salts.

Hydroxyl Remover & Acetyl additive.
Acetyl Chloride.

Hydroxyl displacer & Halogen additive
Simultaneous —
Phosphoric Chloride
Phosphoric Oxychloride
Phosphorous Chloride
& Corresponding Bromine & Iodine
Compounds.
Iodine in presence of amorphous phosphor.

Hydroxyl Remover –
Trichloride Phosphorous.

Hydroxyl remover in alcohols & oxy-acids –
Hydrochloric acid
Hydrobromic "
Hydriodic "

Changing amido-derivatives to azo-derivatives = Nitrous acid

Hydroxyl adders. = Sulphonic group is displaced by OH when Sulphonic Salts are fused with Potassic or Sodic Hydrate – a result dissolved out with an acid —

Carbonyl Remover from acids

Distilling Barium or Calcic salts of such acid containing Carbonyl with Baric or Calcic Hydrates

Amido-acids or glycines formed by Hydrating agents such as Hydrochloric Acid or Baric Hydrate, on Albumenoid Substances. — also by digesting mono-haloid derivatives of acids of Acetic Series with aqueous or Alcoholic Solution of ammonia.

Modifers of violent chemical reactions
Conc Sulphuric acid in Chloroform
Sulphur, Phosphorous, Iodine soluable in Chloroform.

Kerosene disolves Chloride Sulphur
Bisulphide Carbon

Chromic anhydride in glacial acetic A

Peroxide Hydrogen disolves readily in ether, is stable, may even be distilled aquous solution is shaken with the ether,

Bromine is soluable in Ether which has no effect on it.

Alcohol disolves somewhat less amount

Iodine disolves Alcohol Ether Bisul Carbon Chloroform, Benzol, & Carbon tetrachloride

gases soluable in alcohol are Nitrous oxide Carbonic anhydride, phosphoretted Hydrogen Cyanogen. Absolute A disolves small quantities phosphorus & sulphur Alkaline sulphides, & Caustic alkalies ammonia gas

Cyanogen Additive:

Halogen hydrocarbon salts distilled
with Cyanide Potassium

By action of metallic cyanides
on many of the haloid derivatives
of the hydrocarbons more particularly
the Iodine-derivatives. Thus
Iodethane acted on by argentic
Cyanide is converted into Cyanethane

Polymerizing Agents for Hydrocarbons
Chloride Zinc, hot,
Sulphuric acid

Carboxyl $COOH$. additive.

Haloid derivative of the hydrocarbon is converted into corresponding Cyano-derivative by double decomposition with metallic cyanide. The Cyano-derivative is heated with Water & hydrochloric acid or Sulphuric acid or an alkali.

To add $COOH$ into Hydrocarbons like Benzine. Treat with Sulphuric acid to bring to a Sulphonic acid, a salt of this acid is distilled with a Cyanide & resulting cyanide salt decomposed by Hydrochloric acid.

Miller Organic 818.

Sulphonic-139-

Hydrocarbon treated with concentrat'd Sulphuric acid.

Organo-metallic bodies

Action of Sodium alloys of metals on Iodo or Bromo-derivatives of the Hydrocarbons.

Ammonia additive.
Action of alcoholic ammonia on
Nitro-halogen hydrocarbons with heat
Miller Organic 333.

When nitro compounds are treated with reducing agents the O in the NO_2 is generally replaced by equal number atoms H. giving rise to correspdg amido-compounds

Halogen Reducers from Hydrocarbons
Alcoholic Potash (ie) Potash in Alcohol

Hydrogen adder.
Hydroiodic acid + amorphous phosphorus

Isologous Series of Hydrocarbons.

$C_n H_{2n} + 2$ Parafine series of Hydrocarbons

$C_n H_{2n}$ Olefine "

" — 2 Acetylene "

" — 4 Torpene "

" — 6 Benzines "

— 8 Cinnamene "

— 10 Acetenylbenzine "

— 12 Napthalene "

— 14 Diphenyl "

— 16 Stilbene "

— 18 Anthracene "

— 20 Benzylnapthlene "

— 22 Pyrene "

— 24 Chrysene "

— 26 Dinaphthyl "

— 30 — Idrialene

— 32 Tetraphenylethylene

Types –

Hydrocarbon	CH_4
Monohaloid Derivative	CH_3Cl
Amine	CH_3NH_2
Alcohol	CH_3OH
Thioalcohol	CH_3SH
Ethers	$(CH_3)_2O$
Thioethers	$(CH_3)_2S$
Aldehydes	CH_3COH
Ketones	$[CH_3]_2CO$
~~Acids~~	~~$(CH_3CO)_2$~~
Acids	$CH_3CO.(OH)$
Anhydrides	$(CH_3.CO)_2O$
Organo-metallic Compounds	$(CH_3)_2Zn$

	Density
Platinum	21·53
Osmium	21·4
Iridium	21·15
Gold	19·34
Urinum	18·4
Tungsten	17·6
Mercury	13·596
Rhodium	12·1
Thallium	11·91
Palladium	11·8
Ruthenium	11·4
Lead	11·36
Silver	10.53
Bismuth	9·799
Cobalt	8·95
Copper	8·95
Nickel	8·82
Molybdenum	8.62
Cadmium	8·694
Manganese	8·013
Iron	7·844
Indium	7·362
Tin	7·292
Zinc	7·146
Chromium	6·81
Antimony	6·71
Tellurium	6·25
Arsenicum	5·959
Barium	4·0
Aluminium	2·67
Strontium	2·54
Glucinium	2·1
Magnesium	1·743
Calcium	1·578
Rubidium	1·52
Sodium	0·972
Potassium	0·865
Lithium	0·593

56 Hematite
3
164, = 64

112 - 48
Magnetite

Atomic weights

Aluminium	27.5	Palladium	106.5
Antimony	122	Phosphorus	31
Arsenic	75	Platinum	197.1
Barium	210	Potassium	39.1
Boron	11	Rhodium	104.3
Bromine	80	Rubidium	85.5
Cadmium	112	Ruthenium	104.2
Caesium	132.6	Selenium	79.1
Calcium	40	Silicon	28
Carbon	12	Silver	108
Cerium	141.3	Sodium	23
Chlorine	35.5	Strontium	87.6
Chromium	52.5	Sulphur	32
Cobalt	59	Tantalum	182
Copper	63.4	Tellurium	129
Davyum	154.5	Thallium	203.6
Didymium	142.5	Thorinium	234
Erbium	113.7	Tin	118
Fluorine	19	Titanium	50
Gallium	69.9	Tungsten	184
Glucinium	9.3	Uranium	120.5
Gold	196.6	Vanadium	51.3
Hydrogen	1	Yttrium	59.7
Indium	113.4	Zinc	65
Iodine	127	Zirconium	89.5
Iridium	198		
Iron	56		
Lanthanum	140.4		
Lead	207		
Lithium	7		
Magnesium	24		
Manganese	55		
Mercury	200		
Molybdenum	96		
Nickel	59		
Niobium	94		
Nitrogen	14		
Osmium	199		
Oxygen	16		

Number of atoms in Molecule

Hydrogen 2 Chlorine 2 Bromine 2
Iodine 2 Nitrogen 2 Oxygen 2
Selenium 2 Tellurium 2 Mercury 1
Cadmium 1 Phosphorus 4
Arsenic 4 Sulphur 2 at 800°C
6 at 500°C.

Solvents

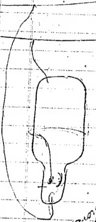
Alcohol for alkaloids, reacts with Halogen Hcbns

Water for all highly oxidized substances

Benzine for Halogen Hcbns — Benzine has peculiarity that it dissolves scarcely any known purely amorphous substance

Toluene & Xylene owing to high boiling points useful in Soxhlet apparatus

April 12 89. Phosphorescent Elec Light



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Fractional Saturation
" Distillation

{ Miller Organic
5 - 64 /